

TRANSLATION

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference B14415.3 PM	FOR FURTHER ACTION	See Form PCT/IPEA/416
International application No. PCT/FR2004/050433	International filing date (day/month/year) 15.09.2004	Priority date (day/month/year) 17.09.2003
International Patent Classification (IPC) or national classification and IPC G03F7/00		
Applicant COMMISSARIAT A L'ENERGIE ATOMIQUE		

1.	This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.
2.	This REPORT consists of a total of <u>8</u> sheets, including this cover sheet.
3.	This report is also accompanied by ANNEXES, comprising: a. <input type="checkbox"/> (sent to the applicant and to the International Bureau) a total of _____ sheets, as follows: <input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions). <input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box. b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) _____, containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).
4.	This report contains indications relating to the following items: <input checked="" type="checkbox"/> Box No. I Basis of the report <input type="checkbox"/> Box No. II Priority <input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability <input type="checkbox"/> Box No. IV Lack of unity of invention <input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement <input type="checkbox"/> Box No. VI Certain documents cited <input type="checkbox"/> Box No. VII Certain defects in the international application <input checked="" type="checkbox"/> Box No. VIII Certain observations on the international application

Date of submission of the demand	Date of completion of this report
Name and mailing address of the IPEA/EP	Authorized officer
Facsimile No.	Telephone No.

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Box No. I Basis of the report

1. With regard to the language, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language _____, which is the language of a translation furnished for the purposes of:
- ☐ international search (Rule 12.3 and 23.1(b))
- ☐ publication of the international application (Rule 12.4)
- ☐ international preliminary examination (Rule 55.2 and/or 55.3)
2. With regard to the elements of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:
- ☐ the international application as originally filed/furnished
- ☒ the description:
- pages 1-9 _____ as originally filed/furnished
- pages* _____ received by this Authority on _____
- pages* _____ received by this Authority on _____
- ☒ the claims:
- nos. 1-10 _____ as originally filed/furnished
- nos.* _____ as amended (together with any statement) under Article 19
- nos.* _____ received by this Authority on _____
- nos.* _____ received by this Authority on _____
- ☒ the drawings:
- sheets 1/4-4/4 _____ as originally filed/furnished
- sheets* _____ received by this Authority on _____
- sheets* _____ received by this Authority on _____
- ☐ a sequence listing and/or any related table(s) – see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____
4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).
- ☐ the description, pages _____
- ☐ the claims, nos. _____
- ☐ the drawings, sheets/figs _____
- ☐ the sequence listing (*specify*): _____
- ☐ any table(s) related to sequence listing (*specify*): _____

* If item 4 applies, some or all of those sheets may be marked "superseded."

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Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement		
1. Statement			
Novelty (N)	Claims	<u>1-10</u>	YES
	Claims	<u></u>	NO
Inventive step (IS)	Claims	<u>4, 6, 8-10</u>	YES
	Claims	<u>1-3, 5, 7</u>	NO
Industrial applicability (IA)	Claims	<u>1-10</u>	YES
	Claims	<u></u>	NO
2. Citations and explanations (Rule 70.7)			
Reference is made to the following documents:			
D1: RUCHHOEFT P ET AL: "Patterning curved surfaces: Template generation by ion beam proximity lithography and relief transfer by step and flash imprint lithography" JOURNAL OF VACUUM SCIENCE AND TECHNOLOGY: PART B, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US, vol. 17, no. 6, November 1999 (1999-11), pages 2965-2969, XP002206574 ISSN: 0734-211X;			
D2: US 2003/104287 A1 (YUASA MITSUHIRO) 5 June 2003 (2003-06-05);			
D3: DE 199 13 683 A1 (INSTITUT FUER MIKROELEKTRONIK STUTTGART STIFTUNG DES OEFFENTLICHEN REC) 25 November 1999 (1999-11-25);			
D4: US-B1-6 416 908 (JAIN KANTI ET AL) 9 July 2002 (2002-07-09);			
D5: ROGERS J A ET AL: "Printing, molding, and near-field photolithographic methods for patterning organic lasers, smart pixels and simple circuits" SYNTH. MET. (SWITZERLAND), SYNTHETIC METALS, 1 NOV. 2000, ELSEVIER,			

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SWITZERLAND, vol. 115, no. 1-3, 1 November 2000
(2000-11-01), pages 5-11, XP002279750 ISSN:
0379-6779;

D6: US-B1-6 375 870 (VISOVSKY NICK J ET AL)
23 April 2002 (2002-04-23);

D7: US-A-5 281 511 (GERHARDT JOERGEN) 25 January
1994 (1994-01-25);

D8: EP-A-0 845 710 (SCHABLONENTECHNIK KUFSTEIN AG)
3 June 1998 (1998-06-03);

D9: ROOS N ET AL: "Nanoimprint lithography with a
commercial 4 inch bond system for hot
embossing" PROCEEDINGS OF THE SPIE - THE
INTERNATIONAL SOCIETY FOR OPTICAL ENGINEERING
SPIE-INT. SOC. OPT. ENG USA, vol. 4343, 2001,
pages 427-435, XP002317296 ISSN: 0277-786X.

The present application does not fulfil the requirements set forth in PCT Article 33(1) because the subject matter of independent claim 1 does not involve an inventive step as defined in PCT Article 33(3).

Document D1 describes a method for forming an embossing mask, characterised by the curved surface of said mask. The original mask used to define the raised structure on said mask is of a type routinely used in charged-particle lithography methods. Such a mask consists of a planar membrane that includes holes through which the particles pass. The image defined by the holes is thus transferred (imparted) to a light-sensitive resin on the curved surface. The surface is subsequently etched using the resin pattern as an etching mask.

Box No. V

Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement

It follows that said document includes the following features of the first claim:

- a curved lithography mask (of the "soft lithography" kind) is produced;
- a pattern is formed on a first planar mask; and
- said pattern is transferred onto a curved surface by means of lithographic projection.

D1 and the wording of the first claim differ by virtue of the specific substrate that is used for the planar mask, namely a silicon-on-insulator structure (SOI).

It should, however, be noted that the use of an SOI substrate in the production of thin-membrane masks for X-ray or particle photolithography is relatively commonplace. Documents D2 and D3 both illustrate the prior art relating to the production of such masks. Even though D1 does not disclose the exact type of mask used, it would be obvious to a person skilled in the art that the method *per se* is in no way dependent on the type of substrate used and that the selection of SOI is one of a plurality of obvious options. As a result, no inventive step can be recognised for the subject matter of claim 1.

The interpretation of the term "transfer" is discussed in more detail in Box VIII hereinafter.

Since a pattern can be transferred in various manners, claim 1 is not precise and includes a whole range of transfer methods.

Many conventional printing, embossing or other methods

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can be cited as involving a transfer of an image or pattern in accordance with the described method, irrespective of the type of material used to produce the initial pattern on the planar mask. In this regard, see documents D4-D8.

Dependent claims 2, 3, 5 and 7 do not contain any features that could contribute to an inventive step because the features disclosed therein correspond to standard practices in the production of masks in general.

However, claim 4, particularly in conjunction with claim 3, enables a clear distinction to be made between the method disclosed in the description and those described in the prior art and can be used as the basis for an inventive step. It would not be obvious for a person skilled in the art to produce a mask such as the one described, for example, in D9 and subsequently impart a non-planar configuration thereto by transferring same onto a new substrate. The preparation of a curved high-resolution mask by physically transferring the membrane/planar SOI mask pattern assembly onto a curved substrate is considered to be a non-obvious alternative to the system proposed in D9. An amended independent claim 1 should specify the exact nature of such a transfer of the resulting pattern onto the SOI mask.

Independent claim 8 describes a lithography mask that has different structural elements to the masks described in the prior art but is structurally similar to the mask described in D4 even though the latter is rigid and planar. No such silicon, silica or nitride substrate,

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which is applied to a curved substrate and has patterns,
is described in the prior art. As a result, novelty and
inventive step can be acknowledged.

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

The wording of claim 1 is vague and open to a plurality of interpretations.

In the French text, the term "report" (herein translated as "transfer") can be interpreted in a variety of manners. It can refer to a physical transfer of a "solid" pattern from one substrate to another or to a reproduction either without physical transfer of the original or with transfer of a portion thereof, for example, a surface portion thereof (by means, for example, of lithographic projection and printing methods, by using the original as a stencil, etc.).

The term "patterns (10)" in claim 8 probably refers to the patterns with no reference signs in figure 4 and to elements (22) in figure 5.

Some of the figures are difficult to interpret because the reference signs used are incoherent. According to figure 4, element "20" denotes the mask yet, according to figure 5, "20" denotes a layer in said mask. The reference signs used for the patterns which are, according to the description, physically transferred change from "10" in figures 2 and 3 to "22" thereafter.

Physical units SI should be used (psi is used on page 9, line 18).